

Fig. 2. Transverse section of a young form of *Rhodophyllum*. Lower Carboniferous, Brockley, near Lesmahagow.

Fig. 3. *Rhodophyllum*, sp., longitudinal section, showing the densely vesicular character of the central area; 3 A, transverse section of the same. Lower Carboniferous, Langside, near Beith, Ayrshire.

PLATE III.

Figs. 1-7. Transverse and longitudinal sections of a group of forms transitional between *Rhodophyllum* and *Aspidophyllum*. Lower Carboniferous, Brockley, near Lesmahagow; Thirdpart and Langside Quarries, near Beith, Ayrshire.

MISCELLANEOUS.

On the Embryology of the Nemertina. By M. J. BARROIS.

I HAVE already disputed the line of demarcation hitherto established between the two kinds of development of the Nemertina (development by the differentiation of a *Morula*, and development by the coalescence of four discoidal plates); I have shown that the four suckers of Müller were not, as has always been supposed, peculiar to the *Pilidium*, but that they occurred in types hitherto regarded as originating from the direct differentiation of the *Morula*.

Soon afterwards I succeeded in discovering the true signification of the four suckers; I found that *the two anterior suckers constitute the cephalic muscular masses, and the two posterior the delicate laminae which form the wall of the body.*

This statement is exceedingly important; for we find in the development of all the Nemertians, even of those in which the development is most simple, a stage in which there is a clear division into two cavities, round each of which the various parts just mentioned are formed, between the two the lateral organs and the œsophagus; round the first the cephalic masses, and round the second the laminae of the wall of the body. In the Enopla this division into two cavities is, from the first, very distinct. It is in the Anopla with a simpler development, such as *Cephalothrix*, that the matter is most difficult of recognition. In consequence of a peculiarity of structure belonging to this group, the two cavities appear in it, from the first, united into a single one; nevertheless it is not difficult, especially after the differentiation of the two great divisions of the musculature, to recognize without hesitation their distinct existence.

The constant and universal occurrence of this important stage, whatever the group may be, enables us easily, starting from this common point, to trace the divergences which give rise to the two great divisions of the Anopla and the Enopla.

Two phenomena are necessary to form one of the Anopla:—1. The lateral organs detach themselves from the œsophagus, and the pro-

stomial and metastomial cavities are placed in communication ; 2. The ganglionic masses of the nervous system are formed *above* the lateral organs, between them and the cephalic masses. Soon the whole, formed by the union of the cephalic masses, the nervous system, and the lateral organs, becomes fashioned into a coherent mass, which is the *head* of the adult. Here the head corresponds exactly to the prostomium, and the body to the metastomium ; the œsophagus, therefore, is situated entirely outside the head.

In the Enopla the ganglionic masses, instead of being formed *above* the lateral organs, are formed *below* them, between the latter and the muscular laminae of the body-wall. Combined with the lateral organs and the œsophagus they constitute a new septum, which continues to keep the two cavities distinct. Subsequently the whole of these different parts (cephalic masses, nervous ganglia, lateral organs) are condensed, as in the Anopla, into a coherent mass, which represents the *head*. Here the head includes, besides the prostomium, a part of the metastomium, with the portion of the œsophagus that is contained in the latter.

The conformity just indicated in the results of the first embryonic processes, and the constant presence of a common stage, demonstrate the general unity of the plan of development. It remains to see whether there exists a gradual passage between the different *modes of production* of that stage.

Let us take for example two embryogenies belonging to the two fundamental types of development, namely *Lineus communis* and *Amphiporus lactiflorens*.

The chief phenomena of the embryogeny of *Amphiporus* are :—1, the accumulation of deutoplasmic elements at the inner part of the segmentation-spheres, arranged radiately, and the formation of an inner nucleus of deutoplasma, which represents the middle lamella ; 2, the invagination at one point of the superficial layer (*gastrula*) ; the invaginated cellular mass (*endoderm*) penetrates into the interior and coalesces with the nucleus of deutoplasm ; we then obtain a stage formed of a superficial layer and of an interior mass ; the superficial layer is the exoderm, and the interior mass represents the union of the middle and inferior lamellæ. The interior mass then undergoes a direct differentiation into musculature (which rapidly acquires its characteristic arrangement) and endodermic fatty elements (which collect in the metastomial cavity). The essential fact of the development is reduced, indeed, to the formation of the musculature by the simple *differentiation of a continuous lamella*.

Lineus communis presents generally in its embryogeny an identical course ; only the musculature is formed by the *coalescence of three primitively distinct pairs of rudiments*. As regards the two primitive lamellæ there is complete concordance in both cases ; the only difference, therefore, in the two most dissimilar types consists in the mode of formation of the mesoderm, the subsequent evolution of this lamella being the same on both sides. From this we may conclude that there exists a perfect continuity between the different modes of production of the common stage.

To each of these two principal modes is to be referred the development of larval forms. Here, in fact, we find an application of the principle lately affirmed again with so much authority by M. Milne-Edwards, that *the larva is only an embryo with independent existence*. The development of the *Pilidium* and of the larva of Desor shows us that the *Pilidium* is only the free representative of one of the stages existing in our first embryonic type (the *Gastrula*-stage at the moment of the origin of the four invaginations of Müller), whilst the larva of Desor is the representative of one of the stages of the second type (embryo composed of an interior mass [middle lamella, endoderm] and of a superficial layer [exoderm]). The *Pilidium* and the larva of Desor consequently cease to be enigmatic forms, opposed by the complexity of their structure to the simplicity of organization of the group; they enter with perfect right, and in the most natural manner, into the normal cycle.

The complete parallelism between the different modes of development at the same time teaches us to see in the fall of the superficial membranes in the *Pilidium* and the types which belong to it nothing more than a mere anomaly due to the exaggerated development of the exoderm. The return to the normal condition which must follow the formation of the internal organs necessarily produces an inverse phenomenon; and it is to this inverse phenomenon that we must ascribe the cases of breaking-down (*Balanoglossus*) or destruction of the skin (*Nemertes*).

These different points show that in the organization of the Nemeritians there is an essential feature *around which all the embryological phenomena group themselves—the division into cephalic musculature and musculature of the body*. This fact has its analogues in the Turbellaria (*Stenostomum*, *Leucops*); it is in complete opposition to the origin of the musculature in the Annelida. Embryogeny, therefore, contrary to what has hitherto been supposed from the complexity of the larval forms, leads to an approximation to the lower Vermes and the Turbellaria, rather than to the higher Vermes and the Annelida. —*Comptes Rendus*, April 10, 1876, p. 859.

Supposed Laurentian Fossil.

To the Editors of the Annals and Magazine of Natural History.

GENTLEMEN,—In the May issue of the 'Annals' appeared a letter from Mr. James Thomson and myself, in which we announced the discovery in the Laurentian Rocks of Harris of what we believed to be unequivocal organic remains. This opinion was based partly upon the remarkable characters exhibited by microscopic sections, and partly upon the too confident belief that the specimens were essentially calcareous in their composition. This latter belief not only formed one of the chief elements on which our conclusion was founded, but strongly weighed with Dr. Carpenter in his indorsement of our original views ('Nature,' May 4th). I wish, however, now to be allowed to state frankly that our opinion as to the calcareous